Claims

1. A stereolithographic method for forming a stereolithographic three-dimensional object by means of sequentially repeating, until a predetermined stereolithographic three-dimensional object is formed, optical building processes of exposing a surface of a photocurable resin composition by way of a planar plotting mask under control to thus form an optically-cured resin layer having a predetermined cross-sectional profile pattern; applying a photocurable resin composition for one layer over the optically-cured resin layer; and exposing the surface of the photocurable resin composition to light by way of the planar plotting mask under control, to thus further form an optically-cured resin layer having a predetermined cross-sectional profile pattern, the method comprising:

using a planar plotting mask, which can continuously change a mask image, as a planar plotting mask;

performing building operation of continuously moving the planar plotting mask with reference to the surface of the photocurable resin composition during at least one of the optical building processes and of exposing the surface of a photocurable resin composition

to light by way of the planar plotting mask while continuously changing a mask image of the planar plotting mask in accordance with a cross-sectional profile pattern of an optically-cured resin layer to be formed and in synchronism with movement of the planar plotting mask, to thus form an optically-cured resin layer having a predetermined cross-sectional profile pattern; and

performing optical building operation such that boundary areas among adjacent plotted areas in the optically-cured resin layer become unnoticeable in a finally-obtained stereolithographic three-dimensional object.

2. The stereolithographic method according to claim 1, wherein, in order to make unnoticeable the boundary area between the adjacent plotted areas in the optically-cured resin layer in a finally-obtained stereolithographic three-dimensional object, at least one of operations (i) to (iii) provided below is performed:

(i) operation for making a total intensity of light radiated onto boundary areas among adjacent plotted areas in an optically-cured resin layer equal or analogous to the intensity of light radiated onto areas other than the boundary areas;

(ii) operation for making the shape of the boundaries between the adjacent plotted areas in the optically-cured resin layer curve; and

(iii) operation for staggering positions of the boundary areas among the adjacent plotted areas in the optically-cured resin layer in vertically-stacked optically-cured resin layers.

3. The stereolithographic method according to claim 1, wherein a planar plotting mask, in which a plurality of micro-optical shutters capable of blocking or allowing transmission of light into microdot areas are arranged in a planar manner, is used as the planar plotting mask; and the surface of the photocurable resin composition is exposed to light while a mask image is continuously changed in accordance with a cross-sectional profile pattern to be formed by means of the plurality of micro-optical shutters during continuous movement of the planar plotting mask.

4. The stereolithographic method according to claim 3, wherein the planar plotting mask is a planar plotting mask where a liquid-crystal shutter or a digital micromirror shutter is arranged in a planar manner.

5. A stereolithographic apparatus comprising:

photocurable resin composition supply means for sequentially supplying a photocurable resin composition of one layer over a mount table or an optically-cured resin layer;

a light source;

a planar plotting mask capable of continuously changing a mask image;

moving means for continuously moving the planar plotting mask with respect to a surface of the photocurable resin composition;

means for continuously changing the mask image of the planar plotting mask in synchronism with movement of the planar plotting mask; and

means for making unnoticeable boundary areas among adjacent plotted areas of optically-cured resin layers within a finally-obtained stereolithographic three-dimensional object.

6. The three-dimensional optical apparatus according to claim 5, wherein the means for making unnoticeable boundary areas among adjacent plotted areas of optically-cured resin layers within a finally-obtained stereolithographic three-dimensional object is means for performing at least one of operations

(i) to (iii) provided below:

(i) operation for making a total intensity of light radiated onto boundary areas among adjacent plotted areas in an optically-cured resin layer equal or analogous to the intensity of light radiated onto areas other than the boundary areas;

(ii) operation for making the shape of the boundaries between the adjacent plotted areas in the optically-cured resin layer curve; and

(iii) operation for staggering positions of the boundary areas among the adjacent plotted areas in the optically-cured resin layer in vertically-stacked optically-cured resin layers.

7. The three-dimensional optical apparatus according to claim 5, wherein the planar plotting mask is a planar plotting mask in which a plurality of micro-optical shutters capable of blocking or allowing transmission of light into microdot areas are arranged in a planar manner.

8. The three-dimensional optical apparatus according to claim 5, wherein the planar plotting mask is a planar plotting mask where a liquid-crystal shutter or a digital micromirror shutter is arranged in a planar

manner.

9. The three-dimensional optical apparatus according to claim 5, further comprising a light-condensing lens which is interposed between a light source and the planar plotting mask and can be continuously moved in synchronism with the planar plotting mask; and a projection lens which is interposed between the planar plotting mask and the surface of the photocurable resin composition and which can be continuously moved in synchronism with the planar plotting mask.